

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

JOHANSSON et al.

Atty. Ref.: 4127-2

Serial No.

Group:

Filed: March 1, 2002

Examiner:

For: ANTENNA

March 1, 2002

Assistant Commissioner for Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

Sir:

In order to place the above-identified application in better condition for examination, please amend the application as follows:

IN THE CLAIMS:

Please cancel claims 1-30 without disclaimer or prejudice. Please add new claims 31-60 as follows:

-- 31. (New) A low profile antenna structure, comprising:

a first metallic patch and a second metallic patch stacked over a ground plane, the first patch comprising a circumference along a patch edge of the first patch, the second patch comprising a circumference along a patch edge of the second patch, the first patch being arranged between the ground plane and the second patch, the first patch being grounded at at least a first zero potential area by electrical connection with the ground plane and a second zero potential area by electrical connection with the ground plane and being fed at a single feed area, the second patch being electrically interconnected to the first patch, and the first patch comprises at least a first aperture and a second aperture located completely within the circumference of the first patch to thereby force current propagating from the feed area to the first zero potential area and the second zero potential area, toward

the patch edge of the first patch to thereby enable radiation from slots defined by the edge of the first patch and the edge of the second patch and the ground plane.

32. (New) A low profile antenna structure, comprising:

a first metallic patch and a second metallic patch stacked over the first patch, the patches being intended to be mounted over a ground plane, the first patch comprising a circumference along a patch edge of the first patch, the second patch comprising a circumference along a patch edge of the second patch, the first patch being arranged between the ground plane and the second patch, the first patch comprising a first zero potential area by connection with the ground plane and a second zero potential area by connection with the ground plane, the second patch being electrically interconnected to the first patch, and the antenna being fed at a single feed area comprised on the first patch, and the first patch comprises at least a first aperture and a second aperture located completely within the circumference of the first patch to thereby force current, propagating from the feed area to the first zero potential area and the second zero potential area, toward the patch edge of the first patch to thereby enable radiation from slots defined by the edge of the first patch and the edge of the second patch and the ground plane.

33. (New) The antenna structure according to claim 32, wherein the first aperture and the second aperture are located on the first patch in such a way that current propagating from the feed area to the first zero potential area propagates in two different paths around the first aperture and that current propagating from the feed area to the second zero potential area propagates in two different paths around the second aperture.

34. (New) The antenna structure according to claim 32, wherein the first aperture is located between the feed area and the first zero potential area, and in that the second aperture is located between the feed area and the second zero potential area.

35. (New) The antenna structure according to claim 32, wherein the second patch is electrically interconnected to the first patch at at least the first zero potential area and the second zero potential area.

36. (New) The antenna structure according to claim 32, wherein the first aperture and the second aperture each have an extension which is substantially perpendicular to a line between the first zero potential area and the second zero potential area.

37. (New) The antenna structure according to claim 32, wherein there is a symmetry of the first patch about a line between the first zero potential area and the second zero potential area.

38. (New) The antenna structure according to claim 32, wherein there is a symmetry of the first patch about a line perpendicular to a line between the first zero potential area and the second zero potential area.

39. (New) The antenna structure according to claim 32, wherein the second patch comprises no openings within its circumference.

40. (New) The antenna structure according to claim 32, wherein the second patch comprises at least one opening within its circumference.

41. (New) The antenna structure according to claim 32, wherein the second patch is electrically split into two halves along a line which is substantially perpendicular to a line between the first zero potential area and the second zero potential area.

42. (New) The antenna structure according to claim 32, wherein the second patch at least covers the first aperture and the second aperture of the first patch.

43. (New) The antenna structure according to claim 32, wherein the first patch comprises further apertures.

44. (New) The antenna structure according to claim 32, wherein the first patch and the second patch are substantially of the same size.

45. (New) The antenna structure according to claim 32, wherein the first patch, in addition to the first aperture and the second aperture, comprises further apertures.

46. (New) The antenna structure according to claim 32, wherein the antenna structure comprises the ground plane.

47. (New) The antenna structure according to claim 46, wherein the ground plane is substantially of the same size as the first patch and the second patch.

48. (New) The antenna structure according to claim 32, wherein the electrical connections from the first patch to the ground plane and the electrical interconnections between the first patch and the second patch, in addition to providing the antenna structure with electrical connections also provides the antenna with mechanical support giving the antenna a self supporting structure.

49. (New) The antenna structure according to claim 32, wherein the first patch is supported by a first dielectric and in that the second patch is supported by a second dielectric, the first dielectric and the second dielectric further providing the antenna with mechanical support giving the antenna a self supporting structure.

50. (New) The antenna structure according to claim 46, wherein the first patch is supported by a first dielectric and in that the second patch is between the first dielectric and a second dielectric and in that the ground plane is supported by the second dielectric, the first dielectric and the second dielectric further providing the antenna with mechanical support giving the antenna a self supporting structure.

51. (New) The antenna structure according to claim 32, wherein the single feed area is probe fed at one point.

52. (New) The antenna structure according to claim 51, wherein the single feed area further comprises inductive feed matching.

53. (New) The antenna structure according to claim 32, wherein the single feed area is probe fed at a plurality of points.

54. (New) The antenna structure according to claim 53, wherein the plurality of points are placed in the feed area along a limited line that if extended would pass through the first zero potential area and the second zero potential area.

55. (New) The antenna structure according to claim 53, wherein the plurality of points are placed in the feed area symmetrically about a line that passes through the first zero potential area and the second zero potential area.

56. (New) The antenna structure according to claim 32, wherein the single feed area is fed by an aperture coupling.

57. (New) A device comprising wireless communication means, wherein the device comprises an antenna according to claim 31.

58. (New) A wireless mobile terminal, wherein the terminal comprises an antenna according to claim 31 for wireless communication.

59. (New) A personal computer card suitable for insertion into an electronic device, wherein the card comprises an antenna according to claim 31.

60. (New) A wireless local area network system comprising a base station and a plurality of terminals which are in wireless communication with the base station, wherein at least one terminal comprises either directly or indirectly an antenna according to claim 31. --

REMARKS

By the foregoing amendment, claims 1-30 have been cancelled without prejudice or disclaimer. New claims 31-60 have been added.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "Version With Markings To Show Changes Made."

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Prompt and favorable examination on the merits is respectfully submitted.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

-- 31. (New) A low profile antenna structure, comprising:

a first metallic patch and a second metallic patch stacked over a ground plane, the first patch comprising a circumference along a patch edge of the first patch, the second patch comprising a circumference along a patch edge of the second patch, the first patch being arranged between the ground plane and the second patch, the first patch being grounded at at least a first zero potential area by electrical connection with the ground plane and a second zero potential area by electrical connection with the ground plane and being fed at a single feed area, the second patch being electrically interconnected to the first patch, and the first patch comprises at least a first aperture and a second aperture located completely within the circumference of the first patch to thereby force current propagating from the feed area to the first zero potential area and the second zero potential area, toward the patch edge of the first patch to thereby enable radiation from slots defined by the edge of the first patch and the edge of the second patch and the ground plane.

32. (New) A low profile antenna structure, comprising:

a first metallic patch and a second metallic patch stacked over the first patch, the patches being intended to be mounted over a ground plane, the first patch comprising a circumference along a patch edge of the first patch, the second patch comprising a circumference along a patch edge of the second patch, the first patch being arranged between the ground plane and the second patch, the first patch comprising a first zero potential area by connection with the ground plane and a second zero potential area by connection with the ground plane, the second patch being electrically interconnected to the first patch, and the antenna being fed at a single feed area comprised on the first patch, and the first patch comprises at least a first aperture and a second aperture located completely within the circumference of the first patch to thereby force current, propagating from the feed area to the first zero potential area and the second zero potential area, toward the patch

edge of the first patch to thereby enable radiation from slots defined by the edge of the first patch and the edge of the second patch and the ground plane.

33. (New) The antenna structure according to claim 32, wherein the first aperture and the second aperture are located on the first patch in such a way that current propagating from the feed area to the first zero potential area propagates in two different paths around the first aperture and that current propagating from the feed area to the second zero potential area propagates in two different paths around the second aperture.

34. (New) The antenna structure according to claim 32, wherein the first aperture is located between the feed area and the first zero potential area, and in that the second aperture is located between the feed area and the second zero potential area.

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36. (New) The antenna structure according to claim 32, wherein the first aperture and the second aperture each have an extension which is substantially perpendicular to a line between the first zero potential area and the second zero potential area.

37. (New) The antenna structure according to claim 32, wherein there is a symmetry of the first patch about a line between the first zero potential area and the second zero potential area.

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47. (New) The antenna structure according to claim 46, wherein the ground plane is substantially of the same size as the first patch and the second patch.

48. (New) The antenna structure according to claim 32, wherein the electrical connections from the first patch to the ground plane and the electrical interconnections between the first patch and the second patch, in addition to providing the antenna structure with electrical connections also provides the antenna with mechanical support giving the antenna a self supporting structure.

49. (New) The antenna structure according to claim 32, wherein the first patch is supported by a first dielectric and in that the second patch is supported by a second dielectric, the first dielectric and the second dielectric further providing the antenna with mechanical support giving the antenna a self supporting structure.

50. (New) The antenna structure according to claim 46, wherein the first patch is supported by a first dielectric and in that the second patch is between the first dielectric and a second dielectric and in that the ground plane is supported by the second dielectric, the first dielectric and the second dielectric further providing the antenna with mechanical support giving the antenna a self supporting structure.

51. (New) The antenna structure according to claim 32, wherein the single feed area is probe fed at one point.

52. (New) The antenna structure according to claim 51, wherein the single feed area further comprises inductive feed matching.

53. (New) The antenna structure according to claim 32, wherein the single feed area is probe fed at a plurality of points.

54. (New) The antenna structure according to claim 53, wherein the plurality of points are placed in the feed area along a limited line that if extended would pass through the first zero potential area and the second zero potential area.

55. (New) The antenna structure according to claim 53, wherein the plurality of points are placed in the feed area symmetrically about a line that passes through the first zero potential area and the second zero potential area.

56. (New) The antenna structure according to claim 32, wherein the single feed area is fed by an aperture coupling.

57. (New) A device comprising wireless communication means, wherein the device comprises an antenna according to claim 31.

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59. (New) A personal computer card suitable for insertion into an electronic device, wherein the card comprises an antenna according to claim 31.

60. (New) A wireless local area network system comprising a base station and a plurality of terminals which are in wireless communication with the base station, wherein at least one terminal comprises either directly or indirectly an antenna according to claim 31. --